Appendix: Pending Claims

8. A method of decoding an array composition comprising

a) providing an array composition comprising:

i) a substrate with a patterned surface comprising discrete sites; and

ii) a population of microspheres comprising at least a first and a second subpopulation, wherein each subpopulation comprises a bioactive agent;

wherein said population of microspheres is randomly distributed on said surface such that any discrete site has at most a single associated microsphere;

b) adding a plurality of decoding binding ligands to said array composition to identify the location of at least a plurality of the bioactive agents.

9. A method according to claim 8 wherein at least one subpopulation of microspheres comprises an identifier binding ligand to which a decoding binding ligand can bind.

10. A method according to claim 8 wherein said decoding binding ligands bind to said bioactive agents.

11. A method according to claim 8 wherein said decoding binding ligands are labeled.

12. A method according to claim 8 wherein the location of each subpopulation is determined.

13. A method of determining the presence of a target analyte in a sample comprising:

a) contacting said sample with a composition comprising:

i) a substrate with a patterned surface comprising discrete sites; and

ii) a population of microspheres comprising at least a first and a second subpopulation each comprising a bioactive agent and not comprising an optical signature;

wherein said population of microspheres is randomly distributed on said surface

such that any discrete site has at most a single associated microsphere; and

b) determining the presence or absence of said target analyte.

14. A method of determining the presence of a target analyte in a sample comprising:

a) contacting said sample with a composition comprising:

i) a substrate with a surface comprising discrete sites; and

ii) a population of microspheres comprising at least a first and a second subpopulation each comprising:

1) a bioactive agent; and

2) an identifier binding ligand that will bind a decoder binding ligand such that the identification of the bioactive agent can be elucidated;

wherein said population of microspheres is randomly distributed on said surface such that any discrete site has at most a single associated microsphere; and

b) determining the presence or absence of said target analyte.

16. A method of making a microsphere array comprising:

a) contacting a substrate with a surface comprising discrete sites with a solution comprising a population of particles; and

b) applying energy to said substrate or said solution, or both, such that at least a subpopulation of said particles randomly associates onto sites.

17. A method according to claim 16 wherein said discrete sites comprise wells.

18. A method according to claim 16 wherein said energy is in the form of agitation.

19. A method according to claim 16, wherein said energy is dipping said substrate into said particles.

20. A method according to claim 16, wherein said substrate is a fiber optic bundle.

21. A method according to claim 8, 13 or 14, wherein said substrate is selected from the group consisting of glass and plastic.

22. A method according to claim 8, 13 or 14, wherein said substrate is a fiber optic bundle.

23. A method according to claim 8, 13 or 14, wherein said bioactive agent is selected from the group consisting of nucleic acids and proteins.

24. A method according to claim 13 or 14, wherein said target analyte is a nucleic acid.

25. A method according to claim 14, wherein said decoder binding ligands comprise labels.

26. A method according to claim 8 or 14, wherein said decoder binding ligands are nucleic acids.

27. A method according to claim 8 or 14, wherein said identifier binding ligands are nucleic acids.

28. A method according to claim 8 or 14, wherein said identifier binding ligands are nucleic acids and said decoder binding ligands are nucleic acids, wherein said identifier binding ligands and said decoder binding ligands comprise substantially complementary sequences.

29. A method according to claim 14, further comprising:

c), adding a plurality of decoding binding ligands to said array composition to identify the location of at least a plurality of the bioactive agents.

30. A method according to claim 8 or 29, wherein each of said decoder binding ligands comprise the same label, and wherein detection of said label results in the identification of the bioactive agent.

31. A method according to claim 8 or 29, wherein a first population of said plurality of decoder binding ligands comprises a first label and a second population of said decoder binding ligands comprises a second label.

32. A method according to claim 8 or 29, wherein a first population of decoder binding ligands is contacted with the array to identify the location of at least a first population of bioactive agents; and

subsequently, a second population of decoder binding ligands is contacted with the array to identify the location of at least a second population of bioactive agents.

33. A method according to claim 8 or 29, wherein said plurality of decoder binding ligands comprises at least a first and a second subpopulation of decoder binding ligands.

34. A method according to claim 8, 13 or 14, wherein said discrete sites are wells.

35. A method according to claim 8, wherein said bioactive agents are nucleic acids.